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ABSTRACT

The report presents the results of a pilot project designed to measure the effect of using Therapen (a device in the shape of a pen which contains a ball point pen and which the student uses to perform kinesthetic and tactile exercises) and the accompanying materials (Tape Program) on 238 educationally handicapped students (6 to 12 years old) with auditory perception handicaps. Students were divided into three groups: the Therapen Group, which used both the Therapen and the Tape Program: the Tape Program group, which used only the teaching materials: and the Control group, which used their regular auditory perception training materials. The Santa Clara Inventory of Developmental Tasks was chosen as the criterion measure to evaluate the effect of using Therapen and/or the Tape Program. Analyses of data led to the conclusion that the use of the Therapen with the teaching materials, and the use of the teaching materials alone, alleviate to a significant effect the auditory perception handicaps of children. In addition, there was evidence that the use of the Therapen with the accompaying teaching materials provides better results than using the teaching materials alone. Tables with statistical data and a paper explaining the special neurological examination given for the Therapen field testing are given. (SBH)

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FINAL EVALUATION REPORT OF THE THERAPEN PILOT PROJECT

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SUMMARY AND CONCLUSIONS

This report presents the results of a pilot project designed to measure the effect of using Therapen and the accompanying teaching materials (Tape Program) on the Auditory Perception and Auditory Memory on educationally handicapped students with auditory perception handicaps. The pilot project lasted from March 9, 1978 to June 7, 1978.

A total of 238 students from 29 schools of the Whittier Area Cooperative Special Education Program (WACSEP) participated in the pilot project. The students were divided randomly into three groups. The first group (78 students), called the Therapen Group, used both the Therapen and the Tape Program. The second group (82 students), called the Tape Program Group, used only the teaching materials. The third group (78 students) called the Control Group used their regular auditory perception training materials.

All students were pretested with several testing systems and their developmental levels were recorded. Also, all three groups were pre-and posttested with the Auditory Perception and the Auditory Memory strands of the Santa Clara Inventory of Developmental Tasks (IDT). The difference between the posttest and pretest means (mean gain) on the IDT test scores were taken as the criterion measure for evaluating the effect of using Therapen and the Tape Program.

The statistical analyses of the generated data indicated that over a scale of 100, the mean gains of the Therapen Group were 30.52, 27.88 and 29.39 on the Auditory Perception strand, Auditory Memory strand, and total IDT respectively. The corresponding mean gains of the Tape Program Group were 18.90, 19.00 and 18.67. And those of the Control Group were 10.80, 10.68 and 10.70. The differences in the mean gains between the Therapen Group and Control Group, between the Tape Program Group and Control Group, and between the Therapen Group and Tape Program Group were all significant at 0.001 significance level.

The generated data indicated that there was a larger number of students in the Control Group and the Tape Program Group than the Therapen Group who scored at the upper end of the total pretest scores on the Auditory Perception and the Auditory Memory strands of the IDT. All those students were eliminated from the three groups and the reduced data was subjected to similar statistical analysis. The results on the reduced data were almost identical to those of the original data.

The statistical analysis on the pretest IDT test scores on both the original and the reduced data indicated that there were significant differences among the three groups. To account for these initial differences among the three groups, the equality of the mean gains of the three groups were tested through the analysis of covariance. In the analysis of the covariance the developmental levels and the total pretest scores on the IDT were taken as the two independent (control) measures, and the gain

on the total IDT test was taken as the dependent (criterion) measure. The analysis indicated that the mean gain of the Therapen Group and the Tape Program Group were significantly (at 0.001 significant level) higher than that of the Control Group. However, the difference between the mean gain of the Therapen Group and the Tape Program Group was not statistically significant at 0.1 significance level.

When the mean gain on the total IDT test scores of the three groups were adjusted, as if they were equivalent at the outset, the results were as follows: The adjusted mean gain of the Therapen Group was approximately 29 points, of the Tape Program Group was approximately 25 points, and of the Control Group was approximately 17 points.

The above analyses lead us to conclude that the use of the Therapen with the teaching materials, and the use of the teaching materials alone, alleviate to a significant extent the auditory perception handicaps of children. In addition, there is strong evidence that the use of the Therapen with the accompanying teaching materials provides better results than using the teaching materials alone.

I INTRODUCTION

This report presents the results of a pilot project designed to measure the effect of using Therapen and the accompanying training materials (Tape Program) on educationally handicapped children with auditory perception problems.

It has been long recognized by pediatricians, neurologists, psychologists and educators that minimal dysfunctioning of the brain, in its processes of encoding and decoding auditory messages, handicaps greatly a child's ability to learn. Preliminary investigations indicate that such dysfunctioning of the brain, which is caused by physical, chemical or electrical conditions could be compensated for through the use of simple electronic devices which transduce sound waves directly to the entire cranial cavity by means of bone conduction. Therapen is such an electronic device. It is accompanied by specific training materials contained in specifically prepared controlled programmed lessons.

The device is designed in the shape of a pen and contains a ball point pen with which the student performs kinesthetic and tactile exercises (including writing) from directions given by the training materials. The directions and the lessons are recorded on audio tape and play on a cassette tape recorder which serves as the sound source. The child holds the device (which is connected to the tape recorder) to his forehead or chin. A light

at its opposite end gives a visual picture of frequencies and intensity of sound, and shows that sound is being transduced from the tape recorder.

Initial experience indicated that Therapen with its accompanying training materials possesses the potential to alleviate, to a significant extent, a student's auditory perceptual handicaps and to improve his learning potentials.

The main purpose of the pilot project was to measure, more precisely, and under controlled statistical conditions, the effect of using Therapen and the Tape Program on the auditory perception, learning achievement levels, and behavior, of educationally handicapped children with accompanying auditory perception problems.

II EXPERIMENTAL DESIGN

The statistical experimental design of the pilot project consisted of the usual pretest-posttest with experimental and control groups design.

1. The Site and the Sample

The sample students were drawn from the Whittier Area Cooperative Special Education Program (WACSEP). The WACSEP is one of ten model programs implementing the California State Master Plan for Special Education. Each child referred for special services receives a thorough assessment before placement. Each child is tested to determine academic

achievement, developmental level, handicapping conditions, emotional state, etc. The procedure involves formal psychological tests, criterion-referenced instruments, medical and neurological exams, teacher and parent observations, and interviews.

Twenty-nine schools from five school districts in WACSEP participated in the pilot project. Teachers and Resource Specialists were asked to select students from six to twelve years of age who had been assessed as educationally handicapped (due in part to auditory perception problems) at the time of admission to the special education program. These students were developmentally delayed so that most were functioning at approximately K-3 grade levels. A total of 238 students participated in the pilot project. These students were divided randomly into three groups; two experimental groups and one control group.

The first experimental group called the Therapen Group (T) consisted of 78 students. This group used one lesson from the tape program each day and "listened" through the Therapen. The second experimental group, called the Program Group (P), consisted of 82 students. This group also used the tape program each day (with references to the Therapen deleted), but listened through earphones. The third group, the Control Group (C), consisted of 78 students. This group did not use the Therapen or the Tape Programs. It used other programs such as the Selma Herr Auditory Training,

the DLM Auditory Perceptual Training Tapes, etc.

Each student was assigned a code number which was used thereafter in place of individual names.

2. Generation of Data

The following sets of data were generated during the pilot project March 9, 1978 to June 7, 1978.

Developmental Level Scores (X_1): The teachers assigned Developmental Level scores for each child. These scores were based on several test scores including Formal Academic Achievement tests (WRAT, Spache), criterion-referenced tests (Santa Clara Inventory of Developmental Tasks (IDT), Systems Fore, Fountain Valley, Brigance, Prime, Ransom, etc.) Auditory Perception and Memory tests (Goldman, Iriscoe, Lindamood, Wepman), and Intelligence tests (WISC, Detroit). These scores are tabulated in Appendix 1.

Medical Tests: Students in the Therapen group (T) were screened for the probability of neurological problems by Robert D. Carpenter, M.D., Appendix 2. He re-reviewed their school medical forms and also administered a special set of physical-neurological tests. (Time constraints precluded the testing of all students in the pilot project). Based on each student's performance an "impression" was given as to the degree of Neurological Impairment and/or Learning Disability each one had. Five degrees were used: Can't

Determine, Very Low, Possible, Probable and Substantial. These results are tabulated in Appendix 1.

IDT Pretest Scores: (X_2) All three groups were pretested during March 9-31 on the Auditory Perception and the Auditory Memory Strands of the IDT. The Auditory Perception Strand contains seven test items; the Auditory Memory Strand contains six items. Each test item is scored 0, 1 or 2. The total score on each strand, and the total score on both strands are tabulated in Appendix 1.

IDT Posttest Scores: (X_3) All three groups were posttested during May 22-June 7, on both strands of the IDT. The posttest scores (X_3) of each student are given in Appendix 1.

3. Criterion Measure ($Y=X_3-X_2$)

The mean difference (gain) between the posttest and pretest score on the IDT was chosen as the criterion measure to evaluate the effect of using Therapen and/or the Tape Program. The differences Y between the pre and posttest scores on all IDT tests for each student are given in Appendix 1.

4. Hypotheses

Three hypotheses were tested based on the generated data:

Hypotheses 1: There is no difference between the mean gain of the control group and the Therapen Group.

Hypotheses 2: There is no difference between the mean gain of the Control Group and the Program Group.

Hypotheses 3: There is no difference between the mean gain of the Therapen Group and Program Group.

III SAMPLE STATISTICS

Table 1 below gives the sample characteristics of the three groups of students:

	AGE				
Group	Mean	Standard Deviation	Male	Female	Total
Control	8.79	1.55	58	20	78
Therapen	8.46	1.17	56	22	78
Tape Program	8.65	1.47	52	30	82
Total	8.63	1.43	166	72	238

TABLE 1

SAMPLE CHARACTERISTICS OF THE SUBJECTS

We notice that the three groups are very similar in terms of age distribution and the ratio of male to female students.

The test scores on the IDT were transformed over a scale of 100. For example, a score of 10 on the 14 test items of the Auditory Perception strand was transformed into $\frac{10}{14} = 71.43$.

The sample means and the standard deviations of the developmental levels, the pretest, the posttest, and the gain on the IDT test scores of the three groups are given in Tables 2, 3 and 4 below.

IDT TEST SCORES

		AUDITORY PERCEPTION			AUDITORY MEMORY			TOTAL		
N = 78	DEVEL. LEVEL	PRE-TEST	POST-TEST	GAIN	PRE-TEST	POST-TEST	GAIN	PRE-TEST	POST-TEST	GAIN
MEAN	1.79	77.20	88.00	10.80	70.41	81.09	10.68	73.96	84.66	10.70
STAND. DEVIA.	0.95	15.23	13.25	12.44	19.54	17.08	18.33	12.33	12.56	11.31

TABLE 2
SAMPLE DATA STATISTICS - CONTROL GROUP

IDT TEST SCORES

		AUDITORY PERCEPTION			AUDITORY MEMORY			TOTAL		
N = 78	DEVEL. LEVEL	PRE-TEST	POST-TEST	GAIN	PRE-TEST	POST-TEST	GAIN	PRE-TEST	POST-TEST	GAIN
MEAN	1.62	58.58	89.10	30.52	55.77	83.65	27.88	57.20	86.59	29.39
STAND. DEVIA.	0.71	23.90	13.56	18.81	22.84	15.57	20.67	21.47	12.05	17.61

TABLE 3
SAMPLE DATA STATISTICS - THERAPEN GROUP

IDT TEST SCORES

N = 82	DEVEL. LEVEL	AUDITORY PERCEPTION			AUDITORY MEMORY			TOTAL		
		PRE-TEST	POST-TEST	GAIN	PRE-TEST	POST-TEST	GAIN	PRE-TEST	POST-TEST	GAIN
MEAN	1.71	71.34	90.24	18.90	69.92	88.92	19.00	70.87	89.54	18.67
STAND. DEVIA.	0.87	20.25	12.32	17.18	17.75	11.79	15.56	16.08	10.39	13.88

TABLE 4
SAMPLE DATA STATISTICS - TAPE PROGRAM GROUP

IV STATISTICAL ANALYSIS OF DATA

The difference between the mean of the posttest and the mean of the pretest score (mean gain) on the IDT test was taken as the criterion measure for evaluating the effectiveness of the Therapen and the Tape Program.

Let X_1, X_2 and X_3 and $Y=X_3-X_2$ denote the developmental level, pretest, posttest, and gain on the IDT test scores respectively. Since the sample sizes of the three groups were large enough, the Z statistic was used to test the equality of the means. For example, to test the equality of the mean gains of the Control Group and the Tape Program Group ($M_c=M_p$) the Z statistic given by

$$Z = \frac{\bar{Y}_c - \bar{Y}_p}{\sqrt{\frac{S_c^2}{n_c} + \frac{S_p^2}{n_p}}} \qquad 14$$

was used, where $\bar{Y}_c$, $\bar{Y}_p$ denote the sample means of the Control Group and the Tape Program Group respectively. Similarly S_c and S_p denote their corresponding sample standard deviations, and n_c and n_p denote their corresponding sample size.

1. Initial Differences:

Tables 2, 3 and 4 indicate that there are certain differences in the mean of the developmental levels and the means of the pre-test IDT test scores among the three groups. To test whether or not those differences are statistically significant, several tests of hypotheses about the equality of those means were conducted. The results are given in Tables 5 and 6 below.

DEVELOPMENTAL LEVEL

Groups	Mean Diff.	Stand. Devia.	Z
Control/Therapen	0.17	0.13	1.31
Control/Program	0.08	0.14	0.57
Program/Therapen	0.09	0.13	0.69

TABLE 5
MEAN DIFFERENCE IN DEVELOPMENTAL LEVELS

IDT

GROUPS	AUDITORY PERCEPTION			AUDITORY MEMORY			TOTAL		
	MEAN DIFF.	STAND. DEVIA.	Z	MEAN DIFF.	STAND. DEVIA.	Z	MEAN DIFF.	STAND. DEVIA.	Z
Control/Therapen	18.62	3.21	5.80*	14.64	3.40	4.31*	16.76	2.80	5.99*
Control/Program	5.86	2.82	2.08	0.49	2.96	0.17	3.09	2.26	1.37
Program/Therapen	12.76	3.51	3.64*	14.15	3.25	4.35*	13.67	3.01	4.54*

TABLE 6
MEAN DIFFERENCES IN IDT PRETEST SCORES

* Significant at 0.001 significance level

Table 5 indicates that there was no significant difference (at 0.05 significance level) among the three groups in their mean developmental levels. The situation was different in the pretest IDT test scores as is indicated on Table 6. There was significant difference (at 0.001 significance level) in the mean IDT pretest scores between the Control Group and the Therapen Group, and also between the Tape Program Group and the Therapen Group. However, again there was no significant difference (at 0.001 significance level) between the Control Group and the Tape Program Group.

2. Mean Gains:

Tables 2, 3 and 4 indicate that the mean gains on the IDT test scores of the Therapen Group were higher than the other two groups, and those of the Tape Program Group were higher than

the Control Group. To test whether or not those differences were statistically significant three tests of hypotheses on the equality of means between each pair of the three groups were performed. The results are given in Table 7 below

IDT

GROUPS	AUDITORY PERCEPTION			AUDITORY MEMORY			TOTAL		
	MEAN DIFF.	STAND. DEVIA.	Z	MEAN DIFF.	STAND. DEVIA.	Z	MEAN DIFF.	STAND. DEVIA.	Z
Therapen/Control	19.72	2.55	7.73*	17.20	3.13	5.50*	18.69	2.37	7.89*
Therapen/Program	11.62	2.85	4.07*	8.88	2.90	3.06*	10.72	2.52	4.26*
Program/Control	8.10	2.36	3.43*	8.32	2.69	3.10*	7.97	2.00	3.99*

TABLE 7
MEAN DIFFERENCE GAINS IN IDT TEST SCORES

* Significant at 0.001 significance level

Table 7 indicates that the mean gains on the IDT test scores of the Therapen Group were significantly higher (at 0.001 significance level) than those of the other two groups, and also the mean gains of the Tape Program Group were significantly higher (at 0.001 significance level) than those of the Control Group. Thus all three hypotheses on page 6 were rejected at 0.001 significance level. These results lead us to conclude (based on the generated data) that both Therapen and the accompanying teaching materials alleviate to a significant extent the auditory percep-

tion and auditory memory handicaps of students. In addition we conclude that the use of Therapen with the accompanying teaching materials produces better results than the use of the teaching materials alone, where the use of earphones substituted the use of Therapen.

Although there was no significant difference between the Tape Program Group and the Control Group in both their mean developmental levels and initial mean scores on the IDT tests, there was significant difference in the mean IDT tests between the Therapen Group and those of the other two groups. Also there was a significantly larger number of students in the Control Group and the Tape Program Group who scored initially at the upper end of the IDT test scores. In order to eliminate the effect of these very high scores on the registered gains, students whose pretest score on the Auditory Perception strand were higher than 12 (our of a maximum score of 14) and/or those whose pretest scores on the Auditory Memory strand were higher than 10 (out of a maximum score of 12) were deleted from the original sample. The reduced Control Group contained 49 students, and the reduced Tape Program Group contained 56 students.

Tables 8, 9 and 10 below give the reduced sample data statistics of the Control, Therapen and Tape Program Groups, respectively.

IDT TEST SCORES

N = 49	DEVEL. LEVEL	AUDITORY PERCEPTION			AUDITORY MEMORY			TOTAL		
		PRE-TEST	POST-TEST	GAIN	PRE-TEST	POST-TEST	GAIN	PRE-TEST	POST-TEST	GAIN
MEAN	1.65	70.26	83.82	13.56	66.50	76.70	10.20	68.37	80.07	11.70
STAND. DEVIA.	.95	12.94	12.94	11.22	14.18	16.66	16.07	10.27	12.39	11.47

TABLE 8
REDUCED SAMPLE DATA STATISTICS - CONTROL GROUP

IDT TEST SCORES

N = 70	DEVEL. LEVEL	AUDITORY PERCEPTION			AUDITORY MEMORY			TOTAL		
		PRE-TEST	POST-TEST	GAIN	PRE-TEST	POST-TEST	GAIN	PRE-TEST	POST-TEST	GAIN
MEAN	1.59	55.00	88.27	33.27	52.14	83.10	30.96	53.63	85.88	32.25
STAND. DEVIA.	.71	22.30	13.87	17.62	21.12	16.11	17.56	19.60	12.42	12.42

TABLE 9
REDUCED SAMPLE DATA STATISTICS - THERAPEN GROUP

IDT TEST SCORES

N = 56	DEVEL. LEVEL	AUDITORY PERCEPTION			AUDITORY MEMORY			TOTAL		
		PRE-TEST	POST-TEST	GAIN	PRE-TEST	POST-TEST	GAIN	PRE-TEST	POST-TEST	GAIN
MEAN	1.46	63.78	88.01	24.23	62.80	86.61	23.81	63.67	87.23	23.50
STAND. DEVIA.	.69	17.96	13.42	16.90	14.90	12.78	13.98	13.52	11.13	13.45

TABLE 10
REDUCED SAMPLE DATA STATISTICS - TAPE PROGRAM GROUP

Table 11 below gives the results of the tests of hypotheses on the equality of the means of the developmental levels among the three groups. Table 12 gives the results of the tests of hypotheses on the equality of the means of the IDT pretests among the three groups, and Table 13 gives the results of the tests of hypotheses on the equality of the mean gains among the three groups.

DEVELOPMENTAL LEVEL

GROUPS	MEAN DIFFERENCE	STANDARD DEVIATION	Z
Control/Therapen	.06	0.18	0.34
Control/Program	0.19	0.16	1.16
Therapen/Program	0.13	0.13	1.00

TABLE 11
MEAN DIFFERENCES IN DEVELOPMENTAL LEVELS - REDUCED DATA

IDT

GROUPS	AUDITORY PERCEPTION			AUDITORY MEMORY			TOTAL		
	MEAN DIFF.	STAND. DEV.	Z	MEAN DIFF.	STAND. DEV.	Z	MEAN DIFF.	STAND. DEV.	Z
Control/Therapen	15.26	3.24	4.70*	14.36	3.24	4.44*	14.74	2.76	5.33*
Control/Program	6.48	3.03	2.14***	3.70	2.84	1.30	4.70	2.33	2.02***
Program/Therapen	8.78	3.59	2.45**	10.66	3.22	3.22*	10.04	2.96	3.33*

TABLE 12
MEAN DIFFERENCES IN IDT PRETEST SCORES - REDUCED DATA

* Significant at 0.001 significance level
** Significant at 0.01 significance level
*** Significant at 0.05 significance level

IDT

GROUPS	AUDITORY PERCEPTION			AUDITORY MEMORY			TOTAL		
	MEAN DIFF.	STAND. DEV.	Z	MEAN DIFF.	STAND. DEV.	Z	MEAN DIFF.	STAND. DEV.	Z
Therapen/Control	19.71	2.65	7.45*	20.76	3.11	6.67*	19.85	2.21	8.98*
Therapen/Program	9.04	3.09	2.93**	7.15	2.81	2.54**	8.75	2.33	3.75*
Program/Control	10.67	2.77	3.85*	13.61	2.96	4.60*	11.10	2.43	4.56*

TABLE 13
MEAN DIFFERENCE GAINS IN IDT TEST SCORES - REDUCED DATA

* Significant at 0.001 significance level
** Significant at 0.01 significance level

The statistical analysis of the reduced data yielded very similar results as of the original data. Table 11 indicates that there was no significant difference (at 0.05 significance level) between each pair of groups in their mean developmental level. Table 12 indicates that there was significant difference (at 0.001 significance level) in the mean pretest scores on the IDT tests between the Control Group and the Therapen Group. The difference between the Program Group and the Therapen Group was significant at 0.01 significance level in mean Auditory Perception strand and significant at 0.001 in the Auditory Memory strand and total IDT. The difference between the Control Group and the Tape Program Group was significant at only 0.05 significance level in the mean Auditory Perception strand and total IDT. Table 13 indicates that the mean gains in the IDT tests of the Therapen Group were significantly higher (at 0.001 significance level) than those of the Control Group, and significantly higher than those of the Tape Program Group at 0.01 significance levels for the Auditory Perception and Auditory Memory strands, and at 0.001 significance level for the total IDT. Similarly, the mean gains of the Tape Program Group were significantly higher (at 0.001 significance level) than those of the Control Group.

Again, the above analyses on the reduced data lead us to conclude that the use of Therapen and/or the accompanying teaching materials alleviate to a significant extent the auditory handicaps of children. Also, the combination of the Therapen and the teaching materials produces significantly better results than the use of the teaching materials alone. Thus all three hypotheses on page 6 are rejected.

Both the original and the reduced data indicated that there were significant differences in the means of the pretest IDT test scores. In order to compensate statistically for those differences, the equality of the mean gain between each pair of the three groups was tested through the analysis of covariance on the reduced data. The developmental level scores X_1, and the pretest scores X_2 on the total IDT tests were taken as the independent variables, and the gain Y on the total IDT test scores was chosen as the dependent variable. Also, the original (non-transformed) test scores were used in the computations.

Tables 14, 15 and 16 below give the results of the analyses of covariance on the reduced data. Table 14 indicates that, after allowing for the initial differences in the development levels and the pretest total IDT scores between the Control Group and the Therapen Groups, the mean gain of the Therapen Group on the total IDT test scores was significantly higher (at 0.001 significance level) than that of the Control Group.

Similarly, Table 15 indicates that the mean gain of the Tape Program Group was significantly higher (at 0.001 significance level) than that of the Control Group.

Table 16 indicates that the mean gain of the Therapen Group was higher than that of the Tape Program Group; however, the difference was not significant at .10 significance level.

	SOURCE OF VARIATION			
	TOTAL	WITHIN	BETWEEN	F
$\Sigma x_1^2 = \Sigma(X_1-\bar{X}_1)^2$	78.49	78.38	0.11	
$\Sigma x_2^2 = \Sigma(X_2-\bar{X}_2)^2$	2,557.70	2,134.30	423.40	
$\Sigma y^2 = \Sigma(Y-\bar{Y})^2$	2,471.93	1,648.50	823.43	
$\Sigma x_1x_2 = \Sigma(X_1-\bar{X}_1)\ (X_2-\bar{X}_2)$	167.72	160.98	6.83	
$\Sigma x_1y = \Sigma(X_1-\bar{X}_1)\ (Y-\bar{Y})$	-66.38	-56.85	-9.53	
$\Sigma x_2y = \Sigma(X_2-\bar{X}_2)\ (Y-\bar{Y})$	-1,869.46	-1,279.01	-590.45	
Regression Coef. b_1	0.8328	0.5972	-	
Regression Coef. b_2	-0.7855	-0.6443	-	
Adjusted Σy^2	1,058.75	858.39	200.36	
Degrees of Freedom	116	115	1	26.84*

TABLE 14
ANALYSIS OF VARIANCE TABLE FOR
CONTROL GROUP-THERAPEN GROUP

* Significant at 0.001 significance level

	SOURCE OF VARIATION			
	TOTAL	WITHIN	BETWEEN	F
$\Sigma x_1^2 = \Sigma(X_1-\bar{X}_1)^2$	70.70	69.72	.98	
$\Sigma x_2^2 = \Sigma(X_2-\bar{X}_2)^2$	1.061.39	1,022.37	39.02	
$\Sigma y^2 = \Sigma(Y-\bar{Y})^2$	1,358.63	1,110.04	248.59	
$\Sigma x_1x_2 - \Sigma(X_1-\bar{X}_1)\ (X_2-\bar{X}_2)$	94.41	88.22	6.19	
$\Sigma x_1y = \Sigma(X_1-\bar{X}_1)\ (Y-\bar{Y})$	-57.89	-42.29	-15.60	
$\Sigma x_2y = \Sigma(X_2-\bar{X}_2)\ (Y-\bar{Y})$	-681.91	-583.43	-98.48	
Regression Coef. b_1	0.0443	0.1298	-	
Regression Coef. b_2	-0.6464	-0.5819	-	
Adjusted Σy^2	915.23	776.04	139.19	
Degrees of Freedom	102	101	1	18.12*

TABLE 15
ANALYSIS OF VARIANCE TABLE FOR
CONTROL GROUP-TAPE PROGRAM GROUP

* Significant at 0.001 significance level

SOURCE OF VARIATION	TOTAL	WITHIN	BETWEEN	F
$\Sigma x_1^2 = \Sigma(X_1-\bar{X}_1)^2$	62.24	61.70	0.54	
$\Sigma x_2^2 = \Sigma(X_2-\bar{X}_2)^2$	2,683.66	2,471.61	212.05	
$\Sigma y^2 = \Sigma(Y-\bar{Y})^2$	2,041.71	1,882.71	159.00	
$\Sigma x_1 x_2 = \Sigma(X_1-\bar{X}_1)(X_2-\bar{X}_2)$	142.93	153.63	-10.70	
$\Sigma x_1 y = \Sigma(X_1-\bar{X}_1)(Y-Y)$	-100.87	-110.14	9.27	
$\Sigma x_2 y = \Sigma(X_2-\bar{X}_2)(Y-\bar{Y})$	-1,770.95	-1,587.33	-183.62	
Regression Coef. b_1	-0.1199	-0.2200	-	
Regression Coef. b_2	-0.6535	-0.6285	-	
Adjusted Σy^2	872.30	860.84	11.46	
Degrees of Freedom	123	122	1	1.6241

TABLE 16
ANALYSIS OF VARIANCE TABLE
TAPE PROGRAM-GROUP-THERAPEN GROUP

Since, in analysis of covariance, the performance of the three groups on the criterion measure (dependent) variable Y (the gain) is related to their performance on the control measure X_1 (developmental level) and X_2 (pretest score) one would like to know how each group would have performed on the criterion measure, <u>if</u> they had been equivalent at the outset with respect to the control measures. The adjustments $\Delta\bar{Y}$ to the mean gain $\bar{Y}$ is computed by the formula

$$\Delta\bar{Y} = b_1 (X_1-X_{1t}) + b_2 (\bar{X}_2-\bar{X}_{2t})$$

Where b_1 and b_2 are the within correlation coefficients, $\bar{X}_1$ and X_2 are the means of X_1 and X_2 for a given group respectively, and $\bar{X}_{1t}$ and $\bar{X}_{2t}$ are the means of the control measures X_1 and X_2 for the two groups combined.

Since the analysis of covariance was conducted pairwise, i.e., two groups were considered each time, rather than the three groups together two different adjustments for each mean result.

Tables 17, 18 and 19 give the adjustments to the mean gains and the adjusted values of the mean gains over a scale of 100 (transformed scores).

GROUP	MEAN GAIN	ADJUSTMENT TO MEAN GAIN	ADJUSTED VALUE OF MEAN GAIN
Control	11.70	-5.58	17.28
Therapen	32.25	3.92	28.33

TABLE 17
ADJUSTMENTS TO MEAN GAINS

GROUP	MEAN GAIN	ADJUSTMENT TO MEAN GAIN	ADJUSTED VALUE OF MEAN GAIN
Control	11.70	-1.42	13.12
Tape Program	23.50	-0.46	23.04

TABLE 18
ADJUSTMENTS TO MEAN GAINS

GROUP	MEAN GAIN	ADJUSTMENT TO MEAN GAIN	ADJUSTED VALUE OF MEAN GAIN
Therapen	32.25	2.76	29.49
Tape Program	23.50	-3.45	26.95

TABLE 19
ADJUSTMENTS TO MEAN GAINS

In computing the adjusted mean gains the absolute value of the adjustment was added to the mean of the Control Group, and subtracted from the means of the Therapen Group and Tape Program Group when the former group was compared to the latter groups. When the Therapen Group was compared to the Tape Program Group the absolute value of the adjustment was subtracted from the mean of the Therapen Group and added to the mean of the Tape Program Group.

The above adjusted mean gains again indicate that the use of Therapen with the accompanying teaching materials resulted in an increase of approximately 29 points (over a scale of 100 points) on the average on the total IDT test scores. The use of the teaching materials alone resulted in an increase of approximately 25 points, whereas, the increase for those who used other teaching materials (Control Group) was approximately 17 points.

THERAPEN
FIELD TEST RESULTS
CONTROL GROUP

stdt#	Age	Dev. Lev.	Sex	Med	IDT TEST									
					Aud. Per.			Aud. Mem.			Total			
					Pre +	Post o	Gain	Pre +	Post o	Gain	Pre +	Post o	Gain	
C-1	8	1	M		12	13	1	8	9	1	20	22	2	
C-2	7	2	M		12	14	2	11	11	0	23	25	2	*
C-3	7	1	M		12	11	-1	9	10	1	21	21	0	
C-4	6.10	1	F		8	9	1	7	8	1	15	17	2	
C-5	6.10	1	M		7	9	2	5	5	0	12	14	2	
C-7	12	4	F		12	14	2	9	12	3	21	26	5	
C-8	12	4	F		13	14	1	11	12	1	24	26	2	*
C-9	9	1.5	M		13	13	0	10	10	0	23	23	0	*
C-10	9	1.5	M		13	12	-1	12	11	-1	25	23	-2	*
C-11	6	K	M		8	10	2	6	9	3	14	19	5	
C-12	8.4	2	F		12	13	1	11	10	-1	23	23	0	*
C-13	10	2	M		12	12	0	8	11	3	20	23	3	
C-14	10	3	M		11	11	0	12	12	0	23	23	0	*
C-15	8	1	M		10	12	2	10	12	2	20	24	4	
C-16	7.6	1	M		7	8	1	6	8	2	13	16	3	
C-17	11.1	2.5	M		8	10	2	7	11	4	15	21	6	
C-18	9.4	2	M		9	12	3	9	9	0	18	21	3	
C-19	9.6	1	M		6	11	5	12	12	0	18	23	5	*
C-20	7.8	1	M		8	13	5	8	12	4	16	25	9	
C-22	8	2	F		13	14	1	10	11	1	23	25	2	*
C-23	12	5	M		12	14	2	8	8	0	20	22	2	
C-24	9	3	F		10	14	4	12	12	0	22	26	4	*

*Medical examination not required. Most subjects already screened as probable neurlotically and/or learning disabled when placed in special education program.

+Administered 3-9-78 - 3-17-78.
oAdministered 5-22-78 - 6-7-78.

* Omitted from the Reduced Sample

THERAPEN
FIELD TEST RESULTS
CONTROL GROUP

tdt#	Age	Dev. Lev.	Sex	Med	IDT TEST									
					Aud. Per.			Aud. Mem.			Total			
					Pre +	Post o	Gain	Pre +	Post o	Gain	Pre +	Post o	Gain	
C-25	9	2	M		14	14	0	10	11	1	24	25	1	*
C-27	11	3.5	M		10	14	4	10	11	1	20	25	5	
C-28	8	1	M		14	14	0	6	11	5	20	25	5	*
C-29	8	1.5	M		13	14	1	6	6	0	19	20	1	*
C-30	10	4	M		12	13	1	8	11	3	20	24	4	
C-31	8	2.5	M		9	13	4	10	11	1	19	24	5	
C-32	7	2	M		13	14	1	10	11	1	23	25	2	*
C-33	9	2	M		11	14	3	11	8	-3	22	22	0	*
C-34	11	2	M		11	10	-1	9	6	-3	20	16	-4	
C-35	8	1	F		10	11	1	7	7	0	17	18	1	
C-36	8	1.5	M		11	14	3	4	4	0	15	18	3	
C-37	8	1	M		9	9	0	6	6	0	15	15	0	
C-38	7	1	M		9	11	2	11	7	-4	20	18	-2	
C-39	7	1	M		9	12	3	6	10	4	15	22	7	
C-40	8.7	1	F		12	13	1	10	10	0	22	23	1	
C-41	10	1	M		13	14	1	11	12	1	24	26	2	*
C-42	10	1	M		13	12	-1	11	11	0	24	23	-1	*
C-43	7	1	M		9	12	3	10	10	0	19	22	3	
C-44	10.1	1.3	F		10	11	1	10	8	-2	20	19	-1	
C-45	7.5	1.5	M		11	12	1	10	12	2	21	24	3	
C-46	8.6	1.5	F		10	10	0	7	8	1	17	18	1	
C-47	10.1	2.5	M	*Medical examination not required. Most subjects already screened as probable neurologically and/or learning disabled when placed in special education program.	14	14	0	3	12	9	17	26	9	*

+Administered 3-9-78 - 3-17-78.
oAdministered 5-22-78 - 6-7-78.

* Omitted from the Reduced Sample

THERAPEN
FIELD TEST RESULTS
CONTROL GROUP

Stdt#	Age	Dev. Lev.	Sex	Med	IDT TEST									
					Aud. Per.			Aud. Mem.			Total			
					Pre +	Post o	Gain	Pre +	Post o	Gain	Pre +	Post o	Gain	
C-48	9.11	2	M		12	14	2	9	10	1	21	24	3	
C-49	7	2	M		10	14	4	6	11	5	16	25	9	
C-50	8.11	2	M		12	14	2	8	11	3	20	25	5	
C-51	9.8	2	F		9	10	1	9	11	2	18	21	3	
C-52	8	3	F		10	14	4	11	12	1	21	26	5	*
C-53	9	4	F		12	14	2	12	11	-1	24	25	1	*
C-54	9.2	3	M		13	14	1	10	11	1	23	25	2	*
C-55	12.5	3	M		11	11	0	9	9	0	20	20	0	
C-56	10	2	F		14	13	-1	4	6	2	18	19	1	*
C-57	8	1	M		14	12	-2	8	10	2	22	22	0	*
C-58	8	1	F		14	8	-4	3	6	3	17	14	-3	*
C-59	9	1	M		11	14	3	4	8	4	15	22	7	
C-60	10	2	M		14	14	0	5	10	5	19	24	5	*
C-61	11	2	M		11	13	2	7	7	0	18	20	2	
C-62	11	2	M		10	11	1	8	10	2	18	21	3	
C-64	11	1	M		9	9	0	9	10	1	18	19	1	
C-65	12	1	M		7	9	2	8	11	3	15	20	5	
C-66	9	1	M		10	12	2	9	7	-2	19	19	0	
C-67	7	1	M		10	12	2	11	11	0	21	23	2	*
C-68	8	1	M		11	14	3	8	9	1	19	23	4	
C-69	6	1	F		6	11	5	6	9	3	12	20	8	
C-70	6	1	M		9	11	2	8	7	-1	17	18	1	

*Medical examination not required. Most subjects already screened as probable neurologically and/or learning disabled when placed in special education program.

+Administered 3-9-78 - 3-17-78.
oAdministered 5-22-78 - 6-7-78.

* Omitted from the Reduced Sample

THERAPEN
FIELD TEST RESULTS
CONTROL GROUP

tdt#	Age	Dev. Lev.	Sex	Med	IDT TEST									
					Aud. Per.			Aud. Mem.			Total			
					Pre +	Post o	Gain	Pre +	Post o	Gain	Pre +	Post o	Gain	
C-77	8	1	F		11	13	2	9	8	-1	20	21	1	
C-78	8	1	F		9	14	5	10	12	2	19	26	7	
C-81	8.4	2	M		14	14	0	5	12	7	19	26	7	*
C-82	7.7	1	M		13	14	1	6	12	6	19	26	7	*
C-83	7	1	M		7	9	2	6	8	2	13	17	4	
C-84	7.8	1.5	M		10	9	-1	7	8	1	17	17	0	
C-85	8.8	1.5	M		9	11	2	6	7	1	15	18	3	
C-90	10	2	M		12	14	2	12	12	0	24	26	2	*
C-91	9	3.5	M		13	14	1	12	12	0	25	26	1	*
C-93	10	2.5	F		12	13	1	10	10	0	22	23	1	
C-94	7	1	F		7	13	6	10	11	1	17	24	7	
C-95	9.3	2.5	M		12	14	2	7	12	5	17	26	9	

*Medical examination not required. Most subjects already screened as probable neurologically and/or learning disabled when placed in special education program.

+Administered 3-9-78 - 3-17-78.
oAdministered 5-22-78 - 6-7-78.

* Omitted from the Reduced Sample

THERAPEN
FIELD TEST RESULTS
THERAPEN GROUP

Stdt#	Age	Dev. Lev.	Sex	Med	IDT TEST									
					Aud. Per.			Aud. Mem.			Total			
					Pre +	Post o	Gain	Pre +	Post o	Gain	Pre +	Post o	Gain	
T-1	8	1	M	Prob.	3	12	9	4	9	5	7	21	14	
T-2	7.4	1	M	Prob.	5	10	5	2	10	8	7	20	13	
T-3	8	2	M	Sub.	6	13	7	7	12	5	13	25	12	
T-4	8	2	M	Sub.	5	13	8	4	10	6	9	23	14	
T-5	6.10	1	F	Sub.	7	14	7	6	11	5	13	25	12	
T-6	6.10	1	F	Sub.	2	11	9	6	9	3	8	20	12	
T-7	10	1	F	Prob.	4	4	0	6	7	1	10	11	1	
T-8	11	4	M	Sub.	10	14	4	6	11	5	16	25	9	
T-9	9	3	F	Prob.	8	14	6	6	11	5	14	25	11	
T-14	9	2	M	Prob.	11	11	0	10	11	1	21	22	1	
T-15	8	2	M	Prob.	11	13	2	8	11	3	19	24	5	
T-17	9	2	M	Poss.	8	9	1	7	11	4	15	20	5	
T-19	10	1.5	F	Poss.	13	13	0	11	11	0	24	24	0	*
T-20	8	2	M	Prob.	12	14	2	10	10	0	22	24	2	
T-21	7.5	1	M	Prob.	12	12	0	10	12	2	22	24	2	
T-22	7.10	1	M	Poss.	9	13	4	7	10	3	16	23	7	
T-23	10	1	M	Absnt	14	14	0	9	9	0	23	23	0	*
T-24	9	2.5	M	Poss.	12	14	2	10	11	1	22	25	3	
T-25	8	1	F	V.Low	11	14	3	10	12	2	21	26	5	
T-26	7.3	1	F	Poss.	9	13	4	5	10	5	14	23	9	
T-27	8.7	1.5	M	V.Low	4	10	6	9	12	3	13	22	9	
T-29	8.11	2	F	Poss.	5	9	4	7	10	3	12	19	7	

+Administered 3-9-78 - 3-17-78.
oAdministered 5-22-78 - 6-7-78.
* Omitted from the Reduced Sample

THERAPEN
FIELD TEST RESULTS
THERAPEN GROUP

tdt#	Age	Dev. Lev.	Sex	Med	IDT TEST									
					Aud. Per.			Aud. Mem.			Total			
					Pre +	Post o	Gain	Pre +	Post o	Gain	Pre +	Post o	Gain	
T-30	6.7	1	M	Prob.	4	10	6	6	7	1	10	17	7	
T-31	6.3	1	M	Sub.	5	13	8	7	11	4	12	24	12	
T-32	8	1	M	Sub.	4	10	6	4	10	6	8	20	12	
T-33	8	1.5	M	Sub.	11	12	1	7	6	-1	17	18	1	
T-34	7	2	F	Poss.	9	12	3	10	10	0	19	22	3	
T-35	10	3.5	M	V.Low	12	14	2	9	12	3	21	26	5	
T-37	8	2	F	V.Low Poss.	9	13	4	5	7	2	14	20	6	
T-38	9	3.5	M	Poss.	9	12	3	9	11	2	18	23	5	
T-39	9	2	M	Sub.	1	10	9	4	10	6	5	20	15	
T-40	8	2	F	Prob.	11	14	3	11	11	0	22	25	3	*
T-41	10	3	F	Prob.	10	14	4	11	12	1	21	26	5	*
T-43	10	2	F	Absnt	11	14	3	7	9	2	18	23	5	
T-44	9	2	M	Prob.	9	12	3	5	6	1	14	18	4	
T-45	9	2	M	Poss. Prob.	6	12	6	3	8	5	9	20	11	
T-46	8	1	M	Prob.	4	12	8	2	6	4	6	18	12	
T-47	8	1	M	Poss.	8	12	4	4	6	2	12	18	6	
T-48	7	1	M	Sub.	8	13	5	1	3	2	9	16	7	
T-49	6	1	F	Prob.	6	9	3	6	8	2	12	17	5	
T-50	10	2	M	Poss.	12	14	2	10	12	2	22	26	4	
T-51	8	2	M	Prob.	12	14	2	8	12	4	20	26	6	
T-52	9	2	M	Prob.	10	14	4	7	12	5	17	26	9	
T-53	10	2	M	Sub.	12	14	2	8	10	2	20	24	4	

+Administered 3-9-78 - 3-17-78.
oAdministered 5-22-78 - 6-7-78.

* Omitted from the Reduced Sample

THERAPEN
FIELD TEST RESULTS

THERAPEN GROUP

Stdt#	Age	Dev. Lev.	Sex	Med	IDT TEST									
					Aud. Per.			Aud. Mem.			Total			
					Pre +	Post o	Gain	Pre +	Post o	Gain	Pre +	Post o	Gain	
T-55	8.7	1.3	M	Prob.	4	10	6	6	9	3	10	19	9	
T-56	9.8	2	M	Sub.	9	13	4	6	12	6	15	25	10	
T-57	10.7	1.3	M	Prob. Sub.	9	14	5	6	12	6	15	26	11	
T-58	7.4	1.3	F	Sub.	6	12	6	4	12	8	10	24	14	
T-59	9.7	3	M	Poss.	9	13	4	5	10	5	14	23	9	
T-60	7.5	1.2	M	Prob.	6	12	6	5	12	7	11	24	13	
T-61	10.8	1	F	Prob.	5	13	8	5	12	7	10	25	15	
T-62	11	1	F	Poss.	4	14	10	4	10	6	8	24	16	
T-63	7.6	1	M	Prob. Sub.	7	14	7	5	10	5	12	24	12	
T-64	9.3	2	F	Poss.	10	12	2	1	10	9	11	22	11	
T-65	9.3	1	M	Prob. Sub.	9	14	5	5	12	7	14	26	12	
T-66	7	K	M	Prob.	1	8	7	0	6	6	1	14	13	
T-67	7.5	1	M	Prob.	5	12	7	3	10	7	8	22	14	
T-75	8.7	1	M	Sub.	12	14	2	8	12	4	20	26	6	
T-76	9.4	2	M	Prob.	14	14	0	9	9	0	23	23	0	*
T-77	7.5	1	M	Prob.	11	13	2	9	8	-1	20	21	1	
T-78	7	1	F	Prob.	8	14	6	10	12	2	18	26	8	
T-79	7	1	M	Sub.	5	14	9	4	10	6	9	24	15	
T-80	7	1	M	Prob.	7	14	7	8	9	1	15	23	8	
T-81	8.5	2	F	Prob. Sub.	5	12	7	8	11	3	13	23	10	
T-82	7.11	1	M	Prob.	11	14	3	7	10	3	18	24	6	
T-83	8.8	2	M	Sub.	8	13	5	9	10	1	17	23	6	

+Administered 3-9-78 - 3-17-78.
oAdministered 5-22-78 - 6-7-78.

* Omitted from the Reduced Sample

THERAPEN
FIELD TEST RESULTS
THERAPEN GROUP

					IDT TEST									
					Aud. Per.			Aud. Mem.			Total			
dt#	Age	Dev. Lev.	Sex	Med	Pre +	Post o	Gain	Pre +	Post o	Gain	Pre +	Post o	Gain	
T-84	8.7	2	M	Prob. Sub.	10	14	4	8	11	3	18	25	7	
T-85	8.8	2	M	Prob.	9	13	4	8	11	3	17	24	7	
T-86	9	2	M	Prob.	14	14	0	11	11	0	25	25	0	*
T-87	9	2	M	Poss.	10	11	1	11	11	0	21	22	1	*
T-88	8	2	F	Poss.	12	13	1	9	9	0	21	22	1	
T-89	10	2	M	V.Low Poss.	11	14	3	9	11	2	20	25	5	
T-90	10	2	M	Absnt	9	13	4	8	11	3	17	24	7	
T-91	9	2	M	V.Low	14	14	0	11	11	0	25	25	0	*
T-92	7.4	1	M	Sub.	8	13	5	5	11	6	13	24	11	
T-93	8.2	1	M	Sub.	6	13	7	3	11	8	9	24	15	
T-94	6.5	K	F	Sub.	0	7	7	1	8	7	1	15	14	
T-95	8.11	1.5	M	Prob. Sub.	7	13	6	7	10	3	14	23	9	

+Administered 3-9-78 - 3-17-78.
oAdministered 5-22-78 - 6-7-78.

* Omitted from the Reduced Sample

THERAPEN
FIELD TEST RESULTS
TAPE PROGRAM GROUP

Stdt#	Age	Dev. Lev.	Sex	Med	IDT TEST									
					Aud. Per.			Aud. Mem.			Total			
					Pre +	Post o	Gain	Pre +	Post o	Gain	Pre +	Post o	Gain	
P-2	10	2	F		9	14	5	9	11	2	18	25	7	
P-3	9	1	M		5	13	8	9	9	0	14	22	8	
P-4	10	2	F		12	9	-3	5	6	1	17	15	-2	
P-5	10	2	M		11	12	1	8	11	3	19	23	4	
P-6	11.6	1	M		10	13	3	4	6	2	14	19	5	
P-7	10	2	M		5	10	5	5	7	2	10	17	7	
P-8	10	3	M		13	13	0	9	11	2	22	24	2	*
P-9	10	2	M		11	13	2	10	11	1	21	24	3	
P-10	9	2	M		10	14	4	9	12	3	19	26	7	
P-11	9	1	M		10	13	3	9	11	2	19	24	5	
P-12	7	1	M		10	14	4	9	10	1	19	24	5	
P-13	7	1.8	M		11	14	3	10	12	2	21	26	5	
P-16	8	1	F		8	13	5	11	12	1	19	25	6	*
P-19	11	3	M		14	14	0	11	12	1	25	26	1	*
P-20	9	1	F		10	9	-1	8	12	4	18	21	3	
P-21	9	1	F		7	11	4	6	11	5	13	22	9	
P-22	8	K	M		8	14	6	9	10	1	17	24	7	
P-23	10	2	F		8	9	1	9	9	0	17	18	1	
P-24	10	1	M		12	13	1	9	11	2	21	24	3	
P-25	10	3	M		14	14	0	11	12	1	25	26	1	*
P-26	7.6	1.7	F		12	13	1	7	8	1	19	21	2	
P-27	8.6	3	F		13	13	0	5	9	4	17	22	5	*

*Medical examination not required. Most subjects already screened as probable neurologically and/or learning disabled when placed in special education program.

+Administered 3-9-78 - 3-17-78.
oAdministered 5-22-78 - 6-7-78.

* Omitted from the Reduced Sample

THERAPEN
FIELD TEST RESULTS
TAPE PROGRAM GROUP

Stdt#	Age	Dev. Lev.	Sex	Med	IDT TEST									
					Aud. Per.			Aud. Mem.			Total			
					Pre +	Post o	Gain	Pre +	Post o	Gain	Pre +	Post o	Gain	
P-28	7.9	1.7	F		12	13	1	11	10	-1	23	23	0	*
P-29	8.9	1.7	M		10	11	1	9	10	1	19	21	2	
P-30	11	3	F		11	14	3	9	11	2	20	25	5	
P-31	9	2	M		12	13	1	9	12	3	21	25	4	
P-32	10	2	M		7	10	3	7	10	3	17	17	0	
P-33	9	1	M		11	12	1	8	10	2	21	22	1	
P-34	7	1	F		10	12	2	6	9	3	16	21	5	
P-35	7	1	F		9	12	3	5	8	3	14	20	6	
P-36	7	1	M		5	11	6	6	9	3	11	20	9	
P-37	10	1	F		10	11	1	8	10	2	18	22	4	
P-39	10	2	M		11	14	3	6	11	5	17	25	8	
P-40	9	2	M		12	14	2	10	12	2	22	26	4	
P-41	8	1	F		14	14	0	8	12	4	22	26	4	*
P-42	6	K	M		7	14	7	2	10	8	9	24	15	
P-43	6	K	M		6	13	7	5	12	7	11	25	14	
P-44	6	1	F		10	14	4	6	11	5	16	25	9	
P-45	8	1	F		8	14	6	9	12	3	17	26	9	
P-46	6	1	F		9	14	5	4	9	5	13	23	10	
P-47	8	1	F		12	14	2	7	11	4	19	25	6	
P-48	7	2	F		10	14	4	8	12	4	18	26	8	
P-49	6	1	M		5	13	8	6	11	5	11	24	13	
P-50	8.3	2	M	*Medical examination not required. Most subjects already screened as probable neurologically and/or learning disabled when placed in special education program.	6	7	1	10	11	1	16	18	2	

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THERAPEN
FIELD TEST RESULTS

TAPE PROGRAM GROUP

					IDT TEST									
					Aud. Per.			Aud. Mem.			Total			
tdt#	Age	Dev. Lev.	Sex	Med	Pre +	Post o	Gain	Pre +	Post o	Gain	Pre +	Post o	Gain	
P-51	8.4	3	M		13	14	1	9	12	3	22	26	4	
P-52	9.10	3	F		5	9	4	8	9	1	13	18	5	
P-53	8.2	2	M		8	12	4	7	12	5	15	24	9	
P-54	9	3	M		14	12	-2	10	12	2	24	24	0	*
P-55	9.8	4	M		8	12	4	7	11	4	15	23	8	
P-56	10.9	5	M		14	14	0	10	12	2	24	26	2	*
P-57	9	2	M		12	14	2	10	12	2	22	26	4	
P-58	10	3	M		13	14	1	10	10	0	23	24	1	*
P-59	13	2.7	M		14	14	0	11	10	-1	25	24	-1	*
P-60	10.5	3	M		13	13	0	11	11	0	24	24	0	*
P-61	12	3	F		13	11	-2	10	11	1	23	22	-1	*
P-62	9	2	F		12	12	0	12	11	-1	24	23	-1	*
P-63	8.11	1	M		13	14	1	9	11	2	22	25	3	*
P-64	8.11	1	M		10	13	3	10	11	1	20	24	4	
P-65	8.4	1	M		13	14	1	8	12	4	21	26	5	*
P-66	8.1	1	F		8	13	5	8	12	4	16	25	9	
P-67	8.5	1	M		12	14	2	7	11	4	19	25	6	
P-68	8	1	M		11	13	2	8	12	4	19	25	6	
P-71	6	K	M		5	10	5	12	10	-2	17	20	3	*
P-72	8	2	M		8	12	4	8	10	2	16	22	6	
P-73	9	2	M		10	12	2	11	11	0	21	23	2	*
P-74	7	1	F		6	10	4	8	11	3	14	21	7	

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THERAPEN
FIELD TEST RESULTS
TAPE PROGRAM GROUP

					IDT TEST									
					Aud. Per.			Aud. Mem.			Total			
dt#	Age	Dev. Lev.	Sex	Med	Pre +	Post o	Gain	Pre +	Post o	Gain	Pre +	Post o	Gain	
-75	7	1	F		7	8	1	8	9	1	15	17	2	
-80	8	2	M		12	13	1	8	10	2	20	23	3	
-81	8	2	F		12	14	2	11	12	1	23	26	3	*
-82	9	2	M		13	14	1	9	12	3	22	26	4	*
-83	8	2	M		13	14	1	11	12	1	24	26	2	*
-84	9	1	M		11	14	3	10	12	2	21	26	5	
-85	9	2	M		12	14	2	12	11	-1	24	25	1	*
-86	9	2	M		10	14	4	11	11	0	21	25	4	*
-88	10	2	F		12	14	2	8	12	4	20	26	6	
-89	7	1	F		7	14	7	6	12	6	13	26	13	
-90	10	2	M		12	14	2	12	12	0	24	26	2	*
-91	8	2	M		12	14	2	11	12	1	23	26	3	*
-92	7	1	F		6	10	4	6	9	3	12	19	7	
-93	9	1	M		7	14	7	7	10	3	14	24	10	
-94	7	1	F		7	13	6	6	8	2	13	21	8	
-95	6	K	M		1	9	8	7	11	4	8	20	12	

*Medical examination not required. Most subjects already screened as probable neurologically and/or learning disabled when placed in special education program.

Administered 3-9-78 - 3-17-78.
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* Omitted from the Reduced Sample

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EXPLANATION OF THE SPECIAL NEUROLOGICAL EXAMINATION GIVEN

FOR THE THERAPEN FIELD TESTING IN THE SPRING OF 1978

The items constituting this test were taken from two sources. One was the neurological examination of a pediatrician who works with these type of pupils and the other from my own neurological examination used for the same purpose.

There are other valuable test items that could have been used in this examination but it was not practical at this time to incorporate them. Reference "Why Can't I Learn?"

Some additional comments were added to the test sheets of a few of the pupils.

1. Under B, EOM's, note if they moved their head when told to move only their eyes. With normal neurological development, a child 5 years of age or older should be able to move their eyes to the right or left without moving their head.

2. Under D, Dominance, a note was made if the pupil called "Right" "Left" or vice versa.

3. Under VI, Left/Right Skills, a notation was made if the pupil either repeated a verbal command verbally to themselves or if they asked the examiner to repeat it, thus indicating an obvious auditory perception problem.

There are three levels of grading in the test. A + indicates normal. A $\pm$ indicates a moderate problem. A - indicates a marked problem.

I. CRANIAL NERVES & EOM'S

A. Right and Left Reversal and/or Confusion (directionality).

"Confusion" is characteristic of a child who is not certain of right and left directions but who gets it correct eventually in a given test. This observation is checked during part I, A in the Dominance testing, I, D when the pupil is asked what hand he uses for eating, writing and ball throwing and then is asked to show his or her right or left hand as the case may be. It is observed in part VI of this test in respect to the pupil's own self and in respect to the examiner.

B. EOM's (Extra Ocular Muslces), Cranial Nerves III, IV and VI.

It is important that the muscles controlling eyeball movement function properly together. The degree to which the pupil can fix his or her gaze on the moving tip of the examiner's index finger is graded as a concentration measure.

C. Cranial Nerve XII.

The testing of the cranial nerves is only significant in relation to the 12th cranial nerve involving tongue movement. I am not aware of any correlation of the other cranial nerves to learning disabilities. Cranial nerve (I) was not tested and has to do with the sense of smell.

D. Mixed Dominance.

In my opinion, mixed dominance is only significant in these pupils when eye and ear dominance are not on the same side.

II. REFLEXES AND MUSCLE STRENGTH (includes III).

I am not aware of the correlation of these two items with the learning disability pupil. Furthermore, the elicitation of reflexes is highly variable because it is highly subjective.

IV. GAIT

Difficulty with normal gait is a gross or large coordination function which indicates further impairment of the nervous system than if only fine coordination were involved. Tandem or heel-toe walking is more significant because it involves a greater degree of balance skill which is a common lack in many of these pupils.

V. FINE MOTOR COORDINATION

Fine motor coordination problems correlate highly with learning disability problems. These items represent three different types of fine coordination function and are tested here in order from the easier to the more difficult to perform for these pupils.

A. Thumb - Index Finger.

This is a rapid repetitive movement. The tip of the thumb and index finger strike one another as rapidly as possible.

B. Hand Supination - Pronation.

This is a rapid reversing movement called diadokokinesis. The hand is rapidly changed back and forth between the position of supination and pronation on their thighs while the subject is seated.

C. Fingers to Thumb.

This test is, in my opinion, the most difficult and personally frustra-

ting test to be performed by any learning disability pupil. When one cannot get his own fingers and thumbs to perform and function in this which appears to be an easy, simple function, then there really must be something wrong.
The top of each finger touches the top of the thumb of the same hand, beginning with the index, then followed successively and individually by the other fingers. After the little finger, then the index starts again and so on. A goodly number of these pupils do well when performing with only one or the other hand but then have varying degrees of difficulty when asked to have both hands working simultaneously.

VI. LEFT - RIGHT SKILLS

Correctly and consistently identifying Right and Left with respect to themselves and to others is, as was mentioned earlier, difficult for the learning disability person.

Part A involves only one simple command.
Part B involves a dual command and this in itself is difficult for these pupils to handle.

IMPRESSION

Based on each pupils performance an "Impression" was circled as to the degree of Neurological Impairment and/or Learning Disability each one had. Five degrees were used:

1. Can't Determine.
2. Very Low.
3. Possible.
4. Probable.
5. Substantial.

It is also my distinct impression that a good number of these pupils would perform better in the classroom were they properly placed and monitored on proper medication along with this and other perceptual training devices.

A copy of my book entitled "Why Can't I Learn" is attached as it gives further information on some of the aforementioned items plus an overall view of the multidisciplinary approach to Learning Disabilities. The book is primarily written for the parents of such pupils.

Respectfully submitted,

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Robert D. Carpenter, M.D.

RDC:vaa
Enclosure